an optical filter having an optical transmissivity responsive to the presence and concentration of hydrogen gas in an ambient environment to which the optical filter is exposed, said optical filter being disposed in proximity to the light source such that said optical filter is illuminated with light from the light source, and being operatively coupled to the thermal source such that the optical filter is heated by the thermal source to an elevated temperature;

a light detector generating an output signal, the state of said output signal being proportional to the intensity of light impinging on the light detector, said light detector being disposed in light-sensing relationship to the optical filter, whereby light from the light source passing through the optical filter impinges on the light detector and generates said output signal as a indication of the presence and/or concentration of hydrogen gas in the ambient environment.

Claim 31 (Previously amended) The hydrogen gas detector of claim 30, wherein the light source comprises a light-generating element selected from the group consisting of incandescent bulbs, light emitting diodes, fluorescent lamps, electroluminescent lamps, and optical lasers, and optical waveguides illuminated by any such light-generating element.

Claim 32 (Previously amended) The hydrogen gas detector of claim 30, wherein the thermal energy source comprises a heat-generating element that is separate from the light source selected from the group consisting of resistive wires, exothermic chemical reactions, ultrasonic radiation, acoustic radiation, microwave radiation, and laser radiation.

Claim 35 (Original) The hydrogen gas detector of claim 30, wherein the light detector comprises a light detection element selected from the group consisting of photodiodes, avalanche photodiodes, phototubes, photomultiplier tubes, microchannel plates, solar cells, image intensifiers, photoconductor detectors, charge-coupled devices, and combinations or arrays thereof.

Claim 36 (Original) The hydrogen gas detector of claim 30, wherein the optical filter comprises a rare earth metal thin film deposited on an optical output surface of the light source.

Claim 37 (Original) The hydrogen gas detector of claim 36, wherein the rare earth metal thin film comprises a rare earth metal component selected from the group consisting of trivalent rare earth metals reactive with hydrogen to form both metal dihydride and metal trihydride reaction products, wherein the metal dihydride and metal trihydride reaction products have differing optical transmissivity.

Claim 38 (Original) The hydrogen gas detector of claim 36, wherein the rare earth metal thin film comprises at least one metal selected from the group consisting of:

scandium, yttrium, lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, actinium, thorium, protactinium, uranium, neptunium, plutonium,

americium, curium, berkelium, californium, einsteinium, fermium, mendelevium, nobelium, and lawrencium,

alloys thereof, and

alloys containing one or more of such metals alloyed with an alloying component selected from the group consisting of magnesium, calcium, barium, strontium, cobalt and iridium.

Claim 39 (Original) The hydrogen gas detector of claim 36, wherein the rare earth metal thin film comprises yttrium.

Claim 40 (Original) The hydrogen gas detector of claim 36, wherein the rare earth metal thin film is overlaid by a hydrogen-permeable material comprising a metal selected from the group consisting of Pd, Pt, Ir, Ag, Au, Ni, Co, and alloys thereof.

Claim 41 (Original) The hydrogen gas detector of claim 36, wherein the rare earth metal thin film is overlaid in sections by a plurality of hydrogen-permeable material, each comprising a metal selected from the group consisting of Pd, Pt, Ir, Ag, Au, Ni, Co, and alloys thereof, wherein each overlay section exhibits a unique permeability to hydrogen.

Claim 42 (Original) The hydrogen gas detector of claim 36, wherein the rare earth metal thin film is overlaid by a hydrogen-permeable material that is doped with a dopant selected from the group consisting of Mg, Ca, Al, Ir, Ni and Co.

Claim 43 (Original) The hydrogen gas detector of claim 36, wherein the rare earth metal thin film is overlaid in sections by a plurality of hydrogen-permeable materials, each of which is doped with a dopant selected from the group consisting of Mg, Ca, Al, Ir, Ni and Co, wherein each overlay section exhibits a unique permeability to hydrogen.

Claim 44 (Original) The hydrogen gas detector of claim 36, wherein the rare earth metal thin film is overlaid by a thin film of a material including a metal selected from the group consisting of palladium, platinum, and iridium.

Claim 45 (Previously Amended) A hydrogen detection system for monitoring an extended or remote area region for the incursion or generation of hydrogen therein, said hydrogen detection system comprising a multiplicity of hydrogen gas detectors as in claim 30, each of which is arranged for exposure to a specific individual locus of the extended area region.

Claim 63 (Currently Amended) A hydrogen gas detector comprising:

a light/heat source,

an optical detector, and

~~an~~ a heat sensitive optical barrier between said light/heat source and said optical detector, said heat sensitive optical barrier responsive to a presence of hydrogen ~~and to heat from said light/heat source~~ for affecting a transmission of light from said light/heat source through said optical barrier in a manner detectable by said optical detector.

Claim 64 (Previously added) The hydrogen gas detector of claim 63, wherein the light/heat source comprises a lamp element emits heat incident to the generation of light.

Claim 65 (Previously added) The hydrogen gas detector of claim 63, wherein the light/heat source comprises an incandescent lamp.

Claim 66 (Previously added) The hydrogen gas detector of claim 63, wherein the light/heat source comprises a fluorescent lamp.

Claim 67 (Previously added) The hydrogen gas detector of claim 63, wherein the optical barrier comprises a rare earth metal thin film.

Claim 68 (Previously added) The hydrogen gas detector of claim 67, wherein the rare earth metal thin film is
deposited on a roughened substrate and has a roughened surface morphology.

Claim 69 (Previously added) The hydrogen gas detector of claim 68, wherein the substrate is roughened by a method selected from the group consisting of mechanical roughening, chemical roughening, deposition of highly exfoliated or porous inorganic underlayers, and deposition of porous polymer underlayers.

Claim 70 (Previously added) The hydrogen gas detector of claim 67, wherein the light/heat source comprises an incandescent lamp having an outer surface, and wherein

the rare earth metal thin film is deposited on said outer surface of the incandescent lamp and is overlaid by a protective film that is permeable to hydrogen gas.